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INSTITUTE

The Mysore Coffee Experiment Station—Bulletin No. 8

DEPARTMENT OF AGRICULTURE

MYSORE STATE

REPORT OF WORK ON THE COFFEE EXPERIMENT STATION, BALEHONNUR

FOR THE YEARS

1930 AND 1931

BANGALORE:
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1932

FOREWORD

AS circumstances have delayed the issue of the Report of the Coffee Experiment Station for the year 1930, it has been thought advisable to publish a combined report for the years 1930 and 1931 thus bringing it as nearly up-to-date as possible. This report also deals with results obtained in the harvest season extending from December 1931 to February 1932.

The report has been prepared mainly by the Manager of the Station, Mr. K. H. Srinivasan, who owing to the tragically sudden death of Dr. M. K. Venkata Rau, has now been placed in charge of all experimental and demonstration work in connection with plantation crops. The report was revised by Dr. Venkata Rau before his death and has since come under revision by myself. The portion dealing with manurial experiments as also the tables of results in this connection have been prepared by the Officiating Agricultural Chemist, Mr. Sampatiengar. Finally, the report contains an account (Appendix I) by Mr. Mayne, Scientific Officer, United Planters' Association of Southern India, of his study of the effect of spraying on leaf fall in coffee and a short note of corrections (*vide* Appendix XI) of Bulletin No. 16, General Series, dealing with Stephanoderes in Java.

June, 1932. LESLIE C. COLEMAN.

The Mysore Coffee Experiment Station—Bulletin No. 8.

ERRATA

Page 3, Statement—Under yield of fruit for 1930-31 *for* 799 *read* 791.

Page 15, line 15, *for* 'illustates' *read* 'illustrates'.

Page 17, line 6, *for* 'was' *read* 'were'.

Page 20, Appendix II, *for* 'cents' *read* 'inches' in the rainfall statement.

Page 24, Appendix IV, Under labour cost of D. S. P. sprayers, against 'Maistry', *for* annas blank *read* 8.

Do do Under labour cost of D. S. P. sprayers, against 'Male coolies', *for* rupees blank *read* 3.

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on the 1st of June 1930. Besides this new appointment, a laboratory assistant and a trained grafter were also appointed in the same year.

The station maintains 120 to 150 farm labourers including Coast and Mysore coolies. Three labour suppliers are engaged to supply 50 coolies each.

Health of the station and climate.—The climate of the station has been very satisfactory, and extremes of heat or cold have not been experienced. 52·4 degrees is the lowest and 94·7 degrees the highest temperature that

was recorded during last year. From October to December, the mornings are usually foggy.

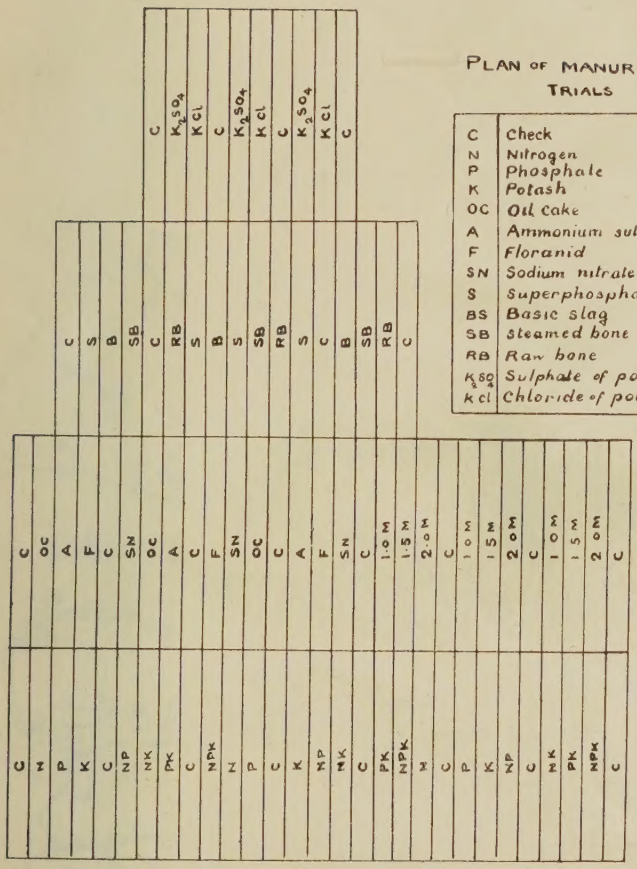
Malaria is the common scourge of the Plantation Districts and this station is no exception. During the year 1930, there were five deaths among the labour force, but three of these succumbed to diseases which they had contracted before coming to the station. The death rate works out to 26 per 1000 of the population. On the whole, the health of the station is good and compares very favourably with that of the neighbouring estates. Wholesome water is supplied in pipes to all the staff and cooly force. Medicines are stocked and medical treatment is given to the staff and labourers by the Sub-Assistant Surgeon, Balehonnur, who visits the station twice a week.

Manuring Experiments.

Old series.—This series consists of experiments with Nitrogenous, Phosphatic, and Potash manures, both artificial and organic, using 25 lbs. N, 37·5 lbs. P_2O_5 and 50 lbs. K_2O to the acre. These manures are tried singly and in combination both in the presence and absence of lime. The availability of different sources of these manures and testing the effects of different combinations of these are also being included. Plate I gives the details and arrangements of experiments. This series of experiments is being conducted since 1925. The crop yields from 1926 to 1932 are furnished in Appendix III.

Manures according to details given in Appendix III were applied during the latter part of 1925 and so only partial effects of such manuring can be seen in the crop of 1926-27 and full effects only from 1927-28 onwards. Thus, we have yields for 5 seasons showing the full effects of manures applied, and average yields for each treatment during the 5 seasons are also given in Appendix III.

In the series dealing with general manurial requirements, the average yields from manured plots for the whole period of 5 years do not show any great appreciable increase over the yield from check plots. The greatest difference is found to be due to the application of Superphosphate in addition to Nitrogen which is 113 lbs. of fruit per acre or nearly 10 per cent over check. When the yields in individual seasons only are taken into account, it is seen, from figures given in Appendix III, that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PLAN OF MANURIAL TRIALS

C	Check
N	Nitrogen
P	Phosphate
K	Potash
OC	Oil cake
A	Ammonium sulphate
F	Floranid
SN	Sodium nitrate
S	Superphosphate
BS	Basic slag
SB	Steamed bone
RB	Raw bone
K_2SO_4	Sulphate of potash
KCl	Chloride of potash

N.B.—FLORANID WAS REPLACED BY NICIFOS 17-45 FROM 1929-30.

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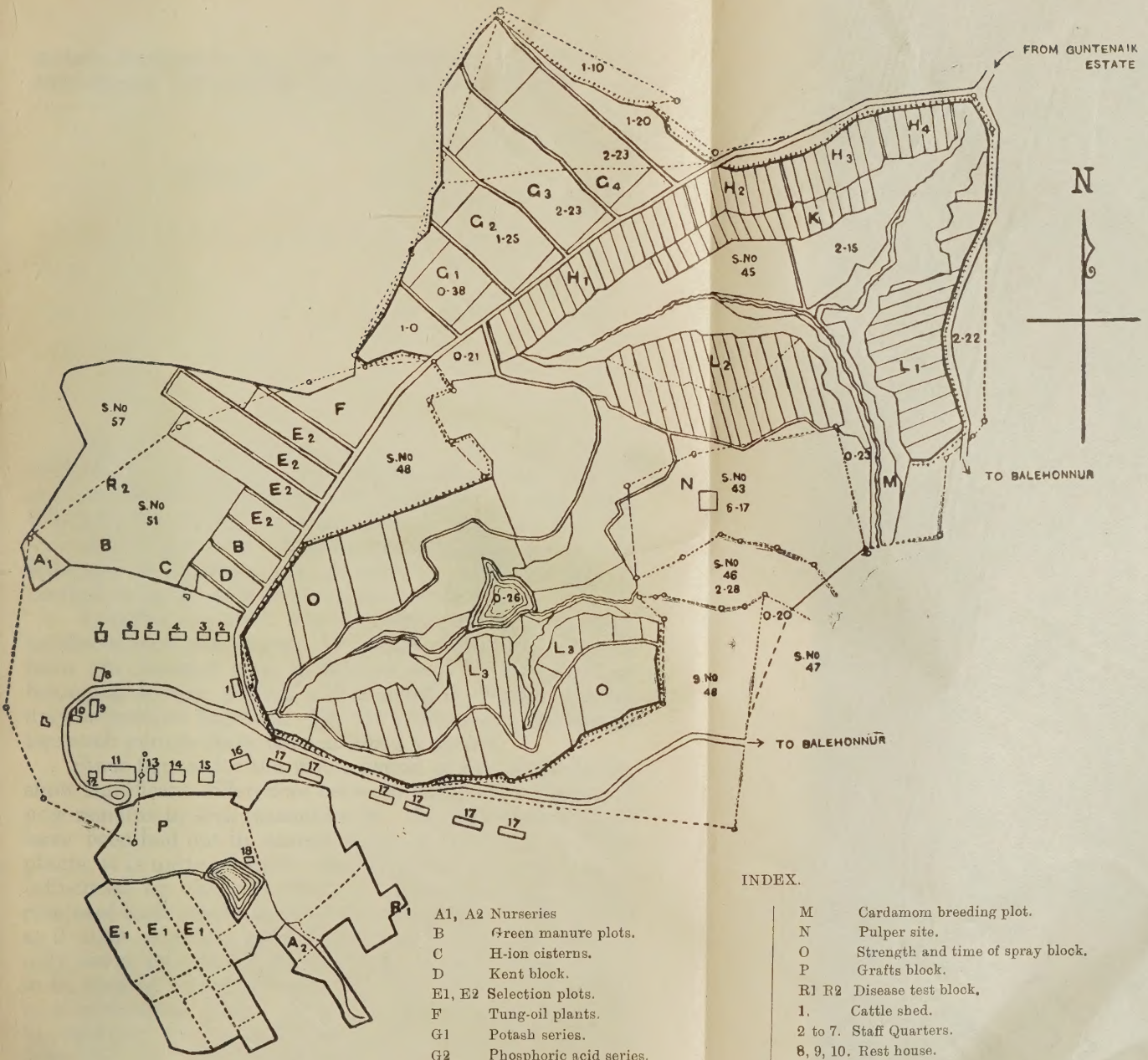
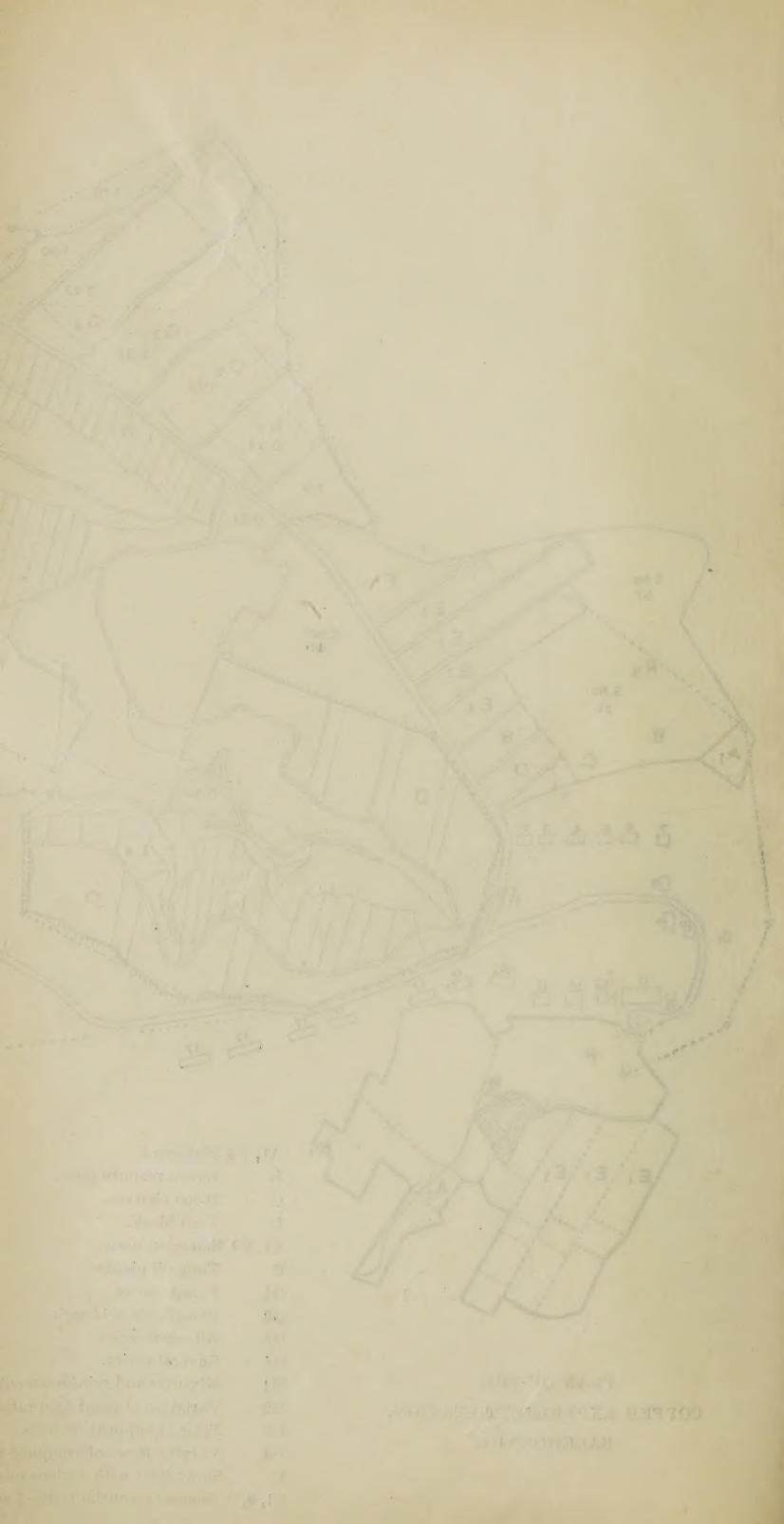


PLAN OF THE
COFFEE EXPERIMENT STATION,
BALEHONNUR.

A1, A2 Nurseries
B Green manure plots.
C H-ion cisterns.
D Kent block.
E1, E2 Selection plots.
F Tung-oil plants.
G1 Potash series.
G2 Phosphoric acid series.
G3 Nitrogen series.
G4 General series.
H1 Mixtures and reinforcements.
H2 Variation of plant food ratio.
H3 Time of application tests.
H4 Varying doses of complete manure.
K Spray tests with various mixtures.
L1, 2, 3 General manurial tests—⅓ acre plots.

INDEX.

M Cardamom breeding plot.
N Pulper site.
O Strength and time of spray block.
P Grafts block.
R1 R2 Disease test block.
1. Cattle shed.
2 to 7. Staff Quarters.
8, 9, 10. Rest house.
11. Laboratory.
12. Gas house.
13. Plant breeding house.
14. Power house.
15. Stores.
16. Labour suppliers' quarters.
17. Cooly lines.
18. Pump house.



certain treatments do show appreciable difference in 1928-29 and 1930-31 and they are tabulated below.

Treatment	Yield of fruit in lbs. per acre.	
	1928–29	1930–31
Check	706	771
Only N	809	799
N plus P	814	853
N plus P plus K	970	984

From the above figures, it will be seen that during 1928-29 the completely manured plots have given 264 lbs. or nearly 33 per cent increase over untreated or check plots. Similarly, the increase during 1930-31 has been 213 lbs. or nearly 27 per cent. Effects due to application of only Nitrogen or Nitrogen and Phosphoric acid are not so marked as in the case of complete manure.

As coffee is a plant with a certain periodicity in crop, results of each year cannot be judged separately. Yields from one bumper crop to another may be compared as belonging to one period, and a number of such periods may be grouped together. For the crops under discussion, two such periods have been grouped together.

Since figures for the whole period of five years do not show significant differences between various treatments, it now remains to seek reasons for it. As the manurial plots have been laid out in narrow strips of four rows of coffee plants, it is quite probable that all check plots have been influenced by the side-effects of manured plots. The results of such effects seem to raise the yields of check plots as if they were also partially manured. Similarly, where only one or two plant-foods have been tried, the effects seem to be masked by the influence of other plant-foods applied to neighbouring plots. That the checks have benefited by manures from neighbouring plots is made probable from the fact that yields from these plots in the lean years of 1928-29 and 1930-31 have not been so low as in 1927-28, *i. e.*, just two years after the first application of manures.

The area in which experiments on various doses of a complete manure mixture were located was found to be too full of patches and so the work was transferred to a new plot in 1930. Figures obtained till then have been given and need no comment.

Coming now to the series in which different nitrogenous manures have been applied, it is seen that the results give indications in favour of Sulphate of Ammonia if average yields for the whole period of five years are taken into consideration.

Coming to the trial of various phosphatic manures, figures for the whole period of five years under consideration indicate results in favour of Superphosphate. This indication is fairly marked in the years 1927-28 and 1930-31.

The last series is the one dealing with the trial of Sulphate of Potash and Muriate of Potash. Average yields covering the whole period of five years do not give any indication in favour of either. Results of even individual years do not show anything in particular. Here too, side effects might have masked the actual effects due to individual manures. As Sulphate of Potash is believed to have a good influence on the quality of coffee, its effects are to be looked for elsewhere.

On trying to apply modern statistical methods for an interpretation of results obtained so far, it was found that the lay out of the plots does not admit of application of Fisher's method in interpreting the results. Hence the method of Engledow and Yule has been applied to interpret the figures on hand, and the results of such interpretation are as follows :—

1. Only N plus P has given significant yields over check in the general manurial requirement series.

2. Ammonium Sulphate has given significant yields over check and groundnut cake in the nitrogenous manure series.

3. Single dose and one-and-a-half doses of complete manure have given significant yields over check and double dose in the series dealing with various doses of manure.

4. Superphosphate has given distinctly significant yields over check, steamed bone and raw bone in the phosphatic manure series. Basic slag has given yields just significant over check and bone.

To eliminate side effects as far as possible and admit of an application of modern statistical methods to interpret

results, the experiments are being re-modelled taking in 12 rows for each treatment so that only the 4 middle rows might be taken to study the effects of manures applied.

New series.—(Appendix III A.) In this series, two sets of experiments are being conducted in the new block bought from Mr. C. S. Crawford. In the first set of experiments, we are testing the availability of nitrogen, phosphoric acid and potash in mixtures; variations of plant food ratios from the standard one of 2N, $3P_2O_5$ and $4K_2O$; and the time of application of general manures. This series also includes the application of general manures at different times and in different doses, *viz.*, full dose before the monsoon; half dose before and half after monsoon; and full dose applied only after monsoon is over.

The second set of experiments in the new series embraces three different blocks lying in different parts of the new estate. In this case, each individual test plot is approximately half an acre in extent. In this set, testing of different sources of N, P and K in different combinations is being tried, but the standard dose here is maintained at 30 lbs. N, 45 lbs. P_2O_5 and 60 lbs. K_2O per acre. Dosage experiments with complete manure consist in applying 10 ozs., 15 ozs., and 20 ozs. per plant.

As these experiments have been newly started in 1930, the results will not be available for some years to come.

Study of soil reaction—Thirty-six cement cisterns measuring $6 \times 6 \times 1\frac{1}{2}$ feet have been constructed to study the relation of growth of coffee to the Hydrogen-Ion concentration of the soil.

For the purpose of this study, all the cisterns have been filled with soil of the same texture and quality and are planted with coffee seedlings of uniform type. At present, 18 of these cisterns are under treatment although all the 36 are planted up. Acid and alkali is being added at regular intervals to these 18 cisterns to bring them to the required reaction, *i.e.*, 4·5—8·0 PH. The Agricultural Chemist who is conducting these experiments on the station is also conducting similar experiments in pot cultures in Bangalore.

Control of plant diseases.

Leaf disease, black-rot, die-back and root-rot are the chief diseases that attack coffee in South India. Spraying

with Bordeaux mixture to mitigate or to eradicate the evil of the first three diseases is being advocated by the Agricultural Department, but no practical remedy has yet been found for root-rot. Mr. Mayne, the Scientific Officer of the U.P.A.S.I., is carrying on scientific investigations on leaf disease, die back, and root-rot. Some of his findings on leaf disease have already appeared in Bulletins Nos. 4 and 6 of the Coffee Experiment Station.

An interesting feature in his investigations of root-rot has been the tracing of root-rot infection to a decaying stump of a shade tree. Assisted by the staff, Mr. Mayne was able to wash the soil under an entire coffee tree over an area of $4 \times 4 \times 4$ feet, thus exposing the entire coffee root system. Fine jets of water under high pressure were used to wash off the soil without causing injury or severing the rootlets.

The results of investigations on black-rot have already appeared in the Departmental Bulletin No. 5, Mycological Series and other publications. Recently, the Officiating Mycologist of the Agricultural Department has been working in the coffee station laboratory and carrying on further researches on black-rot and on fungicidal sprays. The results of these scientific investigations have emphasised the advisability of spraying for the control of these diseases. With this end in view, experiments are in progress (1) to find out suitable sprayers, (2) to test different fungicides and adhesives, (3) to ascertain the most economical strength of fungicidal spray to use, (4) and to study the time or season of applying such sprays to obtain maximum protection with minimum cost.

Testing of different sprayers.

Holder power sprayer, Holder battery sprayers, the Drake and Fletcher Headland and the 2 gallon Holder hand sprayer have all been tested and their usefulness and effeciency reported previously in Bulletin No. 3. Two new sprayers, "Vermorel Power" and "Vermorel Headland Sprayer" were recently imported and tested here.

Vermorel power sprayer.—This is a 3 H. P. engine and double cylinder pump mounted on a trolly. It is essentially a single cylinder motor cycle engine, but water cooled. It is designed to take 4 hoses and spray with a pressure of 240 lbs. per sq. inch. Safety devices, air chamber and pressure gauge are all provided. It is wide, heavy and has a very low clearance and as such its

utility in coffee estates is doubtful although the spray obtained at 240 lbs. pressure is very fine. What is needed in a power sprayer for coffee estates is compactness, light weight, simplicity of mechanism and easy portability on estate roads As this machine lacks all these essential qualities, it is doubtful whether this will ever prove a serious rival to the "Holder Power Sprayer."

Vermorel headland sprayer.—This is a neat little machine, very compact, and is designed to be operated by a single man. It is double acting and has two hose attachments. Being light in weight, it can be easily carried by one man. The quality of spray (using No. 1 jet) is satisfactory but the amount of work got out of this for a work day is just about half that of the Drake and Fletcher sprayer. Further tests will be made with these machines during the next spraying season.

Testing of different fungicides and adhesives.

Powder dusts have proved throughout ineffective; also they have presented practical difficulties in the way of their application. Hence, these are now discontinued (*vide* Mysore Coffee Experiment Station Bulletin No. 3). Liquid sprays are at present under test using different fungicides and adhesives.

Among the liquid sprays, the following are under test:—

(1) Casein Bordeaux, (2) Resin Soda Bordeaux, (3) Resin Soda Burgundy, (4) Fish Oil Resin Soap Burgundy, (5) Casein Alum Bordeaux, (6) Linseed Oil Bordeaux with 10, 20 and 40 ozs. of Linseed oil, (7) Solbar and (8) Bordeaux without adhesive.

Casein, resin, fish oil resin soap and linseed oil are used as adhesives or spreaders to enable the spray mixture to adhere properly to the undersurface of the coffee leaf. Casein Bordeaux is more easily prepared than resin soda Bordeaux, but the latter appears decidedly better than casein in its spreading quality. Nevertheless, the difficulty of preparing resin adhesive and the extra cost involved are points worth considering before deciding in its favour. Linseed oil is also used as a spreader and field observations indicate that this material is not inferior in any way either to casein or resin soda in the matter of adhesive properties. Mr. Mayne's observations furnished in Appendix I on the leaf counts to

estimate the effectiveness of the individual sprays also support this view and throw a good deal of light on the merits of different spray mixtures. Further trials are under way and the results will be available after the present crop is harvested and data studied.

From what is said above, one would prefer to select either casein or linseed oil as an adhesive. But linseed oil spray, though it can be prepared much more easily than casein Bordeaux, presents one or two practical difficulties in the field. Since it is a fast drying oil, it forms a thin coating on the inside surface of wooden barrels or other receptacles used for spraying. After a short time, the film gets thickened due to repeated coating and owing to exposure to weather conditions the film gets detached and floats on the solution as small particles or flakes. These find their way into the spray nozzles and clog them. If these are not cleaned immediately, bursting of the rubber hose will result. Further, the labourers do not like linseed oil spray as they get their clothing soiled with oil.

Apart from these difficulties which could be overcome, one must first of all look to the economic side of spraying. Appendix V shows the comparative cost of spraying and of spraying materials per acre. The cost per acre of casein Bordeaux and linseed oil Bordeaux (10 ozs. per 50 gls.) is almost the same. But looking at the yield table furnished as appendix VI, casein Bordeaux plots have yielded the highest crop followed fairly closely by linseed oil Bordeaux (20 ozs. in 50 gls.). Linseed oil at this concentration costs nearly Re. 1-8-0 per acre more than the cost of casein Bordeaux. Therefore, when selecting a spray combination, one should choose the one that presents the least trouble in field practice coupled with a good return. The results up to the present indicate that casein Bordeaux is the most satisfactory combination.

Results of 1931-32 as shown by crop yield.—Further trials are going on and the final and complete results on this series of experiments can only be had after carrying on these experiments for several years. In Appendix VI are given the crop harvest figures for 1931-32 which, on the whole, have shown very satisfactory results. Spraying with Bordeaux and various adhesives has given on the average more than double the crop harvested from the unsprayed control plots. Bordeaux without adhesive has given decidedly poorer results than Bordeaux with adhesives; but this may be partially due to the fact that

these plots had formerly received no effective treatment. Of the adhesives, casein has given the best results followed fairly closely by linseed Bordeaux (20 czs. per 50 gls.), alum Bordeaux and linseed Bordeaux (10 ozs. per 50 gls.). It is rather difficult to explain why linseed Bordeaux (40 ozs. per 50 gls.) has failed to yield more than or equal to other linseed groups. Resin bordeaux which under laboratory testing has shown superiority over the rest of the adhesives has yielded rather disappointing results. Burgundy also has failed to come up to the expectations and is even poorer than Bordeaux without adhesive.

Strength and time of spraying.—Since spraying on coffee is being gradually taken up by planters, it is of utmost importance to devise means and ways of economy in spraying consistent with effectiveness. With this object in view, experiments are being conducted to study the most economical strength of mixture to use and also the time or times at which the spray must be applied.

In order to test the strength and time of application of sprays, a new set of experiments is in progress. The strength of sprays involves the investigation of the merit of full strength Bordeaux as against half strength and the time of application involving spraying twice in the year, and only once in the year, either before the monsoon or after the monsoon.

The crop picked in this series of experiments during 1931-32 is given in Appendix VII. The indications are that both pre-and post-monsoon sprays are required and that 0·5 per cent Bordeaux might prove quite effective. Some of the control plots have yielded comparatively higher than one per cent or 0·5 per cent pre-or post-monsoon sprayed plots. The reason is that these check plots, namely, 1, 5 and 7 were part of one or other of the treatments when the experiments were first started. Subsequently, the plots were rearranged so as to provide control plots in between each treatment. Before the time of rearrangement, these three plots had the beneficial effect of sprays and therefore the yield in these plots is high. It is expected that the crop figures of the coming year will yield more accurate figures.

Labour requirements and cost of spraying.—The labour force needed with any sprayer depends principally on the nature of water supply. In estates where water has to be transported from a running stream or a tank, a large number of labourers, *i.e.*, 12 to 20 depending upon the

lead is needed to supply one Drake and Fletcher (D.S.P). Double this number is required with a power sprayer. The labour requirements and their cost for the different kinds of sprayers are furnished in Appendix IV. This is based on the practice of the station where water is laid on in pipes to all parts of the estate. Therefore, labour required for transporting water has been excluded in calculating the cost of labour. However, I presume that Re. 0-12-0 to Re. 1-4-0 per day is needed for the cost of water carriage. As regards the working cost of D.S.P. sprayer, it has been found to be advantageous to use two pumps at one centre. This saves one *maistry* and two men labourers and 2 or 3 water coolies. In Appendix IV, working cost of D.S.P. is presented on the above basis. I believe it is quite possible to reduce the labour cost of spraying; but then, this depends upon the temperament of labour and other considerations. Individual practice will suggest possible sources of economy to suit local conditions; hence no hard and fast rule can be laid down regarding allocation of labour. Spraying with the D.S.P. is slightly cheaper than with the power sprayer, but the quality of spray obtained by the power sprayer is undoubtedly better. Appendix V-A gives the total cost of spraying per acre with each of these machines using different spray mixtures either in full or half strength. Depreciation on the value of the machine, etc., is not taken into account. In the same table, the materials required to spray one acre are also shown. In Appendix IV, the capacity of the three principal sprayers is also given. This represents a day's task to the set of coolies engaged, but it is far better to consider the day's work in terms of gallons or barrels of mixture than in terms of acreage. Spraying costs in Appendix V are calculated on the assumption that 400 gallons of the mixture are needed to cover an acre. As stated, great variation in the amount of mixture needed per acre occurs depending upon the kind of coffee bushes one has to deal with; but 400 gallons may be taken as a fair average. The cost of spraying, therefore, depends upon water supply and the amount of mixture consumed per acre.

Control of insect pests.

The Entomologist of the Department of Agriculture has been carrying on detailed investigations on the

control of green bug and borer pests on private estates for a number of years, and hence, it is thought undesirable to duplicate this work on the station at least for the time being. Therefore work on the control of insect pests is not undertaken on the station except spraying against green bug and systematic removal and burning of bored coffee plants as part of the estate routine work.

Plant Breeding.

The previous report of the station activities (Bulletin No. 3) gives a list of the different strains, varieties and species of coffee which are being tested. These consist of arabica selections obtained from the best estates in almost every coffee growing area in South India, of a very large number of hybrids collected from estates in Mysore, and of robusta and liberica types and sub-types collected in South India and obtained from outside. To these have recently been added selections of Coffea congensis, young plants of which are in the nursery. Although the majority of these selections are under three years of age a beginning has been made in further selection and in hybridisation. This latter has been mainly a crossing of promising robusta and hybrid types with Kent.

One of the difficulties in further selection work among hybrids is due to the non-viability of pollen. As the flowering season is very short and as the watering of a large number of plants to bring out the blossom is out of the question, it is necessary to examine plants chosen for selection work long before the blossom showers as to pollen viability. It has been found possible to do this through microscopic examination of flower buds as early as January and to mark out then just which of our hybrids carry viable pollen and so can be self-pollinated. This investigation should greatly assist us in our selection work in the future.

As a result of our plant breeding work of 1930, we have now a considerable number of F_1 generation seedlings growing in the nursery while some have been planted out. In order to avoid an increase in our breeding area these are being planted out to replace selections which have already proved of no value either through lack of vigour, susceptibility to disease or through other undesirable qualities.

Selection and selfing.—Plants are selected with regard to their bearing, vigour and disease resistance. Plants exhibiting such characters are searched for in our selection and varietal plots, and these are selfed or artificially cross-pollinated. In some cases both selfing and artificial fertilising is done on the same plant using different branches or parts of the plant.

Before 1930, paper bags were made use of to cover selfed and crossed flowers. The results were found very unsatisfactory. When these are used, it is found that the growing tips, tender leaves and floral parts are all affected by heat either due to contact with paper surface or due to insufficient æration. Therefore, wide muslin bags supported inside with bamboo rings were substituted for covering the branches. Figures 1 and 2 show the entire plant and branches being thus covered. These are put on before the flowers open and are removed two or three days after the blossom has set.

During 1929, several plants of arabica and hybrids were selected and the blossoms bagged for collecting pure seeds. Appendices IX and X show the number of fruits collected from selfed and crossed flowers. Among hybrids there was a good deal of failure to set seeds due to lack of fertilisation. This seems to be the case in most of the hybrids. The available seeds were harvested and these are growing in the nursery awaiting transplanting. During the blossom time of 1931, several promising arabicas and hybrids were selected and were bagged for collecting pure seeds. Robusta and other species of coffee have not yet come to the bearing stage, and these will be taken up for similar work later on.

Hybridising.—A safe and satisfactory method of emasculating flowers has been tried and this is found to give very satisfactory results. Instead of cutting away only the anthers by opening the buds, the corolla tube is removed in the unopened stage with the attached anthers leaving the stigma behind. Selected plants are hand watered to force blossom to come out at the required time.

As stated artificial crossing of selected arabicas, such as Kent and Coorg types with robusta pollen is being carried on. Also selected hybrids are pollinated with Kent pollen. The F_1 generation seedlings of the above named crosses have been transplanted into permanent beds. It is noticed that, there is failure to set seeds by

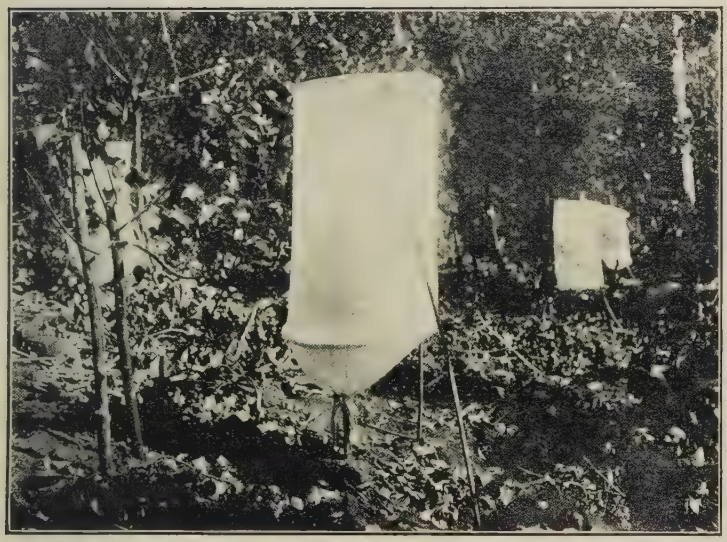


FIGURE 1. YOUNG COFFEE PLANT COVERED BY MUSLIN BAG SUPPORTED WITH BAMBOO RINGS. METHOD OF ISOLATION USED IN SELFING AND CROSSING WORK.

FIGURE 2. BRANCHES OF YOUNG COFFEE PLANT ISOLATED IN MUSLIN BAGS FOR SELFING AND CROSSING.

FIGURE 3. GRAFTS COVERED WITH DIFFERENT KINDS OF TUBES. LEFT TO RIGHT:—NEWSPAPER TUBE DIPPED IN PARAFFIN, XYLONITE TUBE, GLASS TEST TUBE AND PAPER TUBE DIPPED IN PARAFFIN.

robustas when crossed with Kents, but when Kents are used as mothers a fair amount of success is obtained. Hybrids artificially pollinated set seeds fairly well, but selfing such plants has till now yielded very poor and in many cases negative results.

Mr. Mayne, the Scientific Officer of the U. P. A. S. I. is making studies in connection with hybridising work. He has been very kindly assisting the station staff in the hybridising and selection work.

Grafting.—Grafting work done prior to 1930 was of a preliminary character to study the performance of grafts and the application of grafting to the coffee industry. The results were very satisfactory, and have led to the appointment of a trained grafter in 1930 to carry on the work regularly and on lines calculated to yield results that are of practical importance.

The programme of grafting work includes the study of the proper time or season for successful grafting, choice of materials, *viz.*, of stock and scion and also the technique of grafting. Besides these, grafting in the field on stumped coffee and robusta supplies is undertaken to study the advantages, if any, over grafting in nursery beds.

Season of grafting.—Since October 1930, systematic grafting work is carried on doing a number of grafts in almost every week throughout the year. The success of grafts, *i.e.*, the number of grafts that have 'taken' is increasing as will be noticed in Appendix VIII which gives the number of grafts done during each month and the success obtained therefrom. So far as the experiments are in progress, the highest number of successful grafts were obtained in the month of June. It is impossible at this stage to state the best season for grafting. Perhaps, we may be able to say with a certain amount of confidence when we have carried on this work for one full year. The correlation of weather data with this work may lead to certain definite conclusions. Local climatic conditions are bound to affect the results of grafting in other places outside this station.

Stocks and scions.—A few grafts have been done using liberica as stocks but robusta is the one mostly used for this work. Our robusta-arabica grafts have been very successful. It is also contemplated to use hybrid arabica stocks especially Netrakonda, which possesses remarkable vegetative vigour and robustness.

Scions are taken from selected arabica suckers. "Chick" coffee suckers are also being used. Some particularly good bearing arabica trees (mother trees) have been marked out to yield suckers and all the side branches of such trees have been cut off in order to force out suckers. The problem of ensuring an adequate supply of suckers for regular and periodical grafting on a large scale presents a practical difficulty. Experiments so far indicate that the best results are secured with brown woody suckers. Nearly four or five months are required to bring the suckers to such a condition and each mother tree can be expected to yield only some 20 good suckers at a time. Hence, it will be realised that either a considerable number of trees must be marked to supply suckers or work must be limited to a few hundred grafts. To solve this difficulty, experiments are in progress to study the possibility of using all the different parts of a sucker. Although woody suckers are found to be the best so far, the middle semi-woody portion of a sucker is also being used. The results are not so satisfactory in this case, and moreover, they are a bit slow in shooting. The very tender part. of the sucker, *i.e.*, the top part, is found to be unsuitable.

Technique of grafting.—The two grafting methods used on the station are wedge and double cleft grafting. As wedge grafting is much the simpler of the two, it is the one largely used here. Even in the matter of security afforded to the scion, the wedge method seems to be just as good as the double cleft. The practical advantage of this method lies in the large number of grafts a grafter can do in a given time.

In usual grafting practice, wax-cloth, binding twine, and clay smear are all used for the care and safety of the grafts; but our experience indicates that wax cloth and clay smear are not necessary. Wedge grafting with twine binding has given us very satisfactory results and the greatest percentage of success from June grafts was obtained by this method. By this rough method, as many as 120 grafts can be done in a single day if suckers are available.

Grafts need to be covered with a suitable covering material to shade them from too much heat and direct sunlight. The tubes are removed as soon as the scions begin to shoot, some time about the 5th or 6th week. In the earlier period of our experiments, glass tubes $9'' \times 1\frac{1}{2}''$

were used. Although the results did not discourage their extended use, the initial cost was very high. Breakages and loss were inevitable, and hence, these had to be given up. Non-breakable xylonite tubes were imported from England, but, unfortunately all the grafts covered with these developed a kind of fungus which inhibited the growth of scions. Hence, new covering material had to be sought for. Newspaper pieces rolled into cylinders and impregnated with paraffin wax both inside and outside were tried with great success. Now, these are exclusively used and the results are very satisfactory. Paper tubes are cheap and cost about $\frac{1}{12}$th of an anna each and can be made on the estate. The introduction of these has very appreciably reduced the cost of grafting. Figure 3 illustates the different kinds of covering tubes that have been used.

Nursery grafts and field grafts.—Another means of solving the practical difficulty and reducing expense of grafts is that of grafting in the field. Although grafting in the nursery, has been found a feasible proposition, yet, the extra cost involved in transplanting them to the fields, the loss or retardation due to the seasonal conditions or planting methods, and above all the extra care necessary to raise nursery grafts are points for consideration. The results of our field grafts have been very satisfactory, (Appendix VIII) and in fact the greatest amount of success *i.e.*, 93% as against 76% in the nursery grafts has been obtained in the field grafts done during June 1931. Loss in this method is much less and transplanting difficulties, and extra care and cost are averted.

The practical application of field grafts in estate grassy patches or stump-rot areas is very hopeful, and promises to open up wide possibilities as a method of reclaiming such waste land attached to estates. To study this point further, grassy patches and stump-rot areas have been supplied with robusta seedlings and when these are established, they will be taken up for grafting.

The method of grafting as practised on the station is very simple so that ordinarily intelligent estate coolies can be taught to do it. As a matter of fact, three planters' men were trained in this work in 1930. Since planters are showing a keen interest in grafted coffee, and as they desire to get their men trained in this work, it has been decided to hold on the station short courses to teach grafting.

Short courses on grafting and spraying.—During the year 1931, two courses were held one on grafting and the other on spraying and six men from various parts who were sent over for training by the estate owners were kept on the Farm and taught the work.

Cardamom Breeding.

In the past year, attempts were made to collect available varieties of cardamoms, both upright and trailing kinds to serve the purpose of our foundation stock. We now possess five upright and five trailing varieties collected from cardamom growing districts of Mysore, Bombay and Madras. Seven of these have been planted out in the field. Further collections will be made in the next few years. The existing seedlings will be planted in a suitable locality and the breeding work will be taken up when they begin to bear seeds.

Pepper.

Besides growing and breeding coffee and cardamom, one other plantation produce, *i.e.*, pepper is also being grown with a view to breed and evolve a suitable variety. At present, cuttings of two varieties, *viz.*, Balamkota and Kalluvalli two varieties noted for high yield and quality have been obtained from selected plants grown on the Marthur Farm. Attempts will be made to collect other promising varieties for breeding purposes.

Other Crops.

Green manures.—Fourteen green manure crops were grown in the previous year out of which Boga medalloa (Tephrosia candida) Crotalaria anagyroides, Crotalaria usaramoenisis, Indigofera endecaphylla and Vigna oligosperma have been chosen for growth on a large scale for seed purposes.

Aleurites fordi or Tung oil. (Chinese wood oil).—The seed of this oil tree has been obtained and planted and as many as 60 plants are growing here. The seeds of this tree yield an oil which is in great demand for high quality varnishes.

Field Day.

A field day and exhibition of work of the station were held on the 26th and 27th November 1931 when

over 400 planters gathered from all parts of the coffee growing areas. The planters were also present at the formal opening of the Laboratory by His Highness the Maharaja of Mysore on the 27th evening. His Highness the Maharaja of Mysore with his staff and the Dewan of Mysore was pleased to camp on the Farm for a period of three days.

On the morning of the 28th instant, His Highness with the party, went round the Farm and inspected all the experimental plots. Spraying with different kinds of sprayers was also demonstrated before His Highness. His Highness showed a keen interest in all the experiments that were under progress.

Visitors.—In addition to His Highness the Maharaja of Mysore, two other distinguished visitors, Sir T. Vijayaraghavacharya and the Hon'ble the British Resident in Mysore visited the Farm. Many coffee planters, both European and Indian have also visited the Farm. The number of visitors is on the increase.

Mysore Coffee Experiment Station Bulletins.

No. 1. The Mysore Coffee Experiment Station.—What it is doing for the improvement of Mysore Coffee.

No. 2. The Coffee Berry Borer. (Stephanoderes hampei.)

No. 3. Report of work on the Coffee Experiment Station, Balehonnur for the years 1925-30.

No. 4. Seasonal periodicity of Coffee Leaf Disease (Hemileia vastatrix, B & Br).

No. 5. Annual report of the Coffee Scientific Officer, 1930-31.

No. 6. Seasonal Periodicity of Coffee Leaf Disease (Hemileia vastatrix, B & Br) Second Report.

No. 7. Annual Report of the Coffee Scientific Officer 1931-32.

APPENDIX I.

Observations on Spraying Experiments at the Coffee Experiment Station During the Years 1930 and 1931.

In an attempt to supplement the records of crop yield from the various spraying experiment blocks and also to study directly the effect of different sprays and different times of spraying, a series of observations have been carried out in September 1930 and 1931 and, in the case of the time and strength of spray series, also in February 1932. The method employed was to take a number of branch systems of definite type and take counts of the number of growing points and the number of mature leaves. The results were expressed as the number of leaves per growing shoot.

In the case of the small plot experiment series on different types of spray, 20 branches were taken in each of the three plots receiving any given treatment. Inspection showed that these almost always showed a good agreement. The three sets of 20 were taken together and the Standard error of the whole calculated. In the case of the large plot experiments on time and strength of spray, 60 branches were taken at random through each plot, and calculations made in the same way.

1. Different types of spray.

The following are the results of the counts made in September 1930 and 1931.—

Mixture used	1930		1931	
	No. of leaves	Standard deviation	No. of leaves	Standard deviation
Linseed Oil Bordeaux 10 ozs. ...	6·35	±·21	6·28	±·23
,, ,, 40 ,, ...	6·28	±·25	5·77	±·23
,, ,, 20 ,, ...	6·09	±·19	6·23	±·25
Casein Bordeaux	5·90	±·18	6·19	±·24
Fish Oil Resin Soap Burgundy. ...	5·57	±·23	5·66	±·26
Resin Soda Bordeaux	5·50	±·16	5·94	±·20
Alum Bordeaux	5·38	±·24	6·00	±·28
Resin Soda Burgundy	4·87	±·24	5·97	±·21
Solbar 3 per cent	3·10	±·11	5·12	±·19
Check. No Spray	2·40	±·13	3·13	±·17
Bordeaux without Adhesive ...	...	..	5·40	±·19

While the differences between the majority of the treatments are hardly of statistical significance, Linseed Oil Boardeaux 10 ozs. and Casein Bordeaux both show good results in both years. There is a

general reduction in differences in 1931 as compared with 1930 and this may perhaps be attributed to the slightly less severity of the disease as indicated by the rather higher count in the checks, which is statistically significant.

Solbar shows itself of little value and has been omitted in later sprays.

The value obtained for spraying without adhesive shows some advantage from the use of adhesive but the difference, in view of the extremely heavy rainfall of August 1931, is not very large.

2. Time and Strength of Spray.

These observations were started in September 1931 and repeated in February 1932. The results are given in the accompanying table.

	September 1931		February 1932	
	No. of leaves	Standard deviation	No. of leaves	Standard deviation
1 per cent Spray, May and September	6·55	±·22	4·29	±·17
·5 per cent ,, ,, ...	6·17	±·19	2·45	±·12
1 per cent, Spray, May only ...	6·39	±·21	2·22	±·14
·5 per cent ,, ,, ...	6·82	±·20	1·67	±·16
1 per cent ,, September only ...	3·31	±·21	2·38	±·17
·5 per cent ,, ,, ...	3·34	±·19	2·34	±·15
Check III	2·38	±·19	0·95	±·11
,, IV	2·94	±·19	1·48	±·13
,, V	3·47	±·23	1·70	±·14

The results are of some interest in suggesting that there is little, if any, difference in effectiveness between the half strength and the full strength spray and also in emphasizing the greater importance of the pre-monsoon spray.

The figures for the February observations have to be interpreted with the crop yield of the different plots in view. Although the leaf amount in the half strength twice sprayed plot is significantly less than that in the full strength twice sprayed plot, it must be borne in mind that the former yielded a very much bigger crop and leaf fall may have been due to this rather than to any reduced effectiveness. Such an explanation, however will not fit the significant difference between the half and full strength May spray only. The difference is not very big but may be due perhaps to the greater reduction in effectiveness of the single spray towards the end of the year which shows itself more clearly with the weaker spray. It will be noted that there is no difference between the two September sprays at any time.

The results from the checks are very variable. This is doubtless due to the residual effects of previous spray treatment which shows itself in the crop figures.

This work is to be continued in the future.

W. WILSON MAYNE.

APPENDIX II.

Rainfall Statement for the years 1930 and 1931

	1930	1931
January	0·10 Cents	... Cents
February	...	...
March	0·83	1·50
April	2·41	7·02
May	4·93	3·11
June	16·86	10·44
July	25·76	24·67
August	17·34	49·88
September	12·05	8·85
October	10·42	1·45
November	1·71	3·88
December	...	0·69
Total ...	92·41	111·49

Highest rainfall on a single day 6·98 in 1926.
" " " 4·95 in 1930.
Average of four years. 98·44 cents.

Meteorological data of the Coffee Experiment Station, Balehonnur.

	1930				1931			
	Max. Temp.	Min. Temp.	Mean of Max. and Min.	Humidity percentage at 8 A.M.	Max. Temp.	Min. Temp.	Mean of Max. and Min.	Humidity percentage at 8 A.M.
January ...	82	59	71	73	82	60	71	70
February ...	83	60	72	72	87	61	74	80
March ...	89	63	76	81	89	64	77	73
April ...	89	66	78	82	88	68	78	86
May ...	85	66	76	89	86	67	77	84
June ...	78	66	72	86	78	67	73	83
July ...	73	66	70	93	75	66	71	90
August ...	74	75	70	92	73	66	70	92
September ...	77	65	71	92	76	65	70	95
October ...	80	65	72	92	79	64	72	85
November ...	79	61	70	91	78	61	69	90
December ...	81	60	71	83	80	63	72	79

APPENDIX III.

Yield Statement of Coffee Manurials.

18 Acre Block 1926 to 1932.

General Manurial Requirements.

Sl. No.	Treatment	Yield in lbs. of Green berries per acre							
		1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	Average from 1927-32	Probable error of mean
1	Check	2313	584	706	1718	771	2164	1189	±213
2	Groundnut Cake. (N)	2256	547	809	1925	791	2008	1217	±208
3	Super (P)	2530	610	950	1816	835	2115	1265	±199
4	Potash (K)	2327	650	748	1737	746	1855	1147	±180
5	N plus P	2518	684	814	2064	853	2098	1302	±215
6	N plus K	2336	591	673	2027	834	2128	1250	±229
7	P plus K	2396	499	607	1683	735	1866	1078	±194
8	N plus P plus K	2854	607	970	1691	984	2050	1260	±178

Standard deviation of differences between comparable plots=117·3
Standard error of mean difference = 52·4

Nitrogenous Manures.

9	Check	2068	601	834	1154	912	2097	1120	±175
10	Groundnut Cake	2138	476	1071	1192	1222	2125	1217	±178
11	Ammonium Sulphate	2484	782	914	1460	1209	2464	1366	±201
12	Nicifos*	...	...	...	1195	1307	2160	...	...
13	Sodium Nitrate†	...	...	...	1200	1148	2451	...	...

Standard deviation of differences between comparable plots= 158
Standard error of mean difference = 70·6

* Nicifos 17/45 was used in place of Floranid from 1929–30
† Sodium Nitrate was used in place of green manure from 1928–29

APPENDIX III—(*contd.*)

Varying Doses of Complete Manure.

Sl. No.	Treatment	Yield in lbs. of green berries per acre							
		1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	Average from 1927-32	Probable error of mean
14	Check	1449	398	691	1019	878	Transferred to another plot.	746	± 90
15	Complete Manure Single dose	2361	441	833	1184	1077		884	±111
16	C. M. 1·5 dose	2190	449	920	1216	873		864	±107
17	C. M. Double dose	1884	380	726	1112	681		725	±101

Standard deviation of differences between comparable plots = 65·3
Standard error of mean difference = 32·6

N.B.—Varying doses of complete manure experiments were discontinued in this plot from 1930-31 as the plot was over-grown with grass.

Various Phosphatic Manures.

18	Check	1484	754	517	1295	865	1823	1050	±155
19	Super	1764	976	618	1707	1136	1951	1277	±164
20	Basic Slag	1702	720	600	1584	993	1953	1170	±175
21	Steamed Bone	1308	620	668	1280	900	1830	1059	±152
22	Raw Bone	1350	697	615	1184	831	1931	1051	±162

Standard deviation of differences between comparable plots = 125
Standard error of mean difference = 55·9

Various Potash Manures.

23	Check	1174	905	420	1490	1247	2048	1222	±181
24	Sulphate of Potash	1271	881	552	1637	1102	1631	1160	±143
25	Muriate of Potash	1455	943	560	1749	1095	1696	1208	±153

Standard deviation of differences between comparable plots = 142
Standard error of mean difference = 63·5

APPENDIX III-A.

NEW MANURIAL BLOCK 1929-32.

Mixtures and reinforcement of manures.

Sl. No.	Treatment	Average yield of green berries in lbs. per acre		
		1929–30	1930–31	1931–32
	I. Series.			
1	Check	1088	555	1788
2	Cake, Super, and K_2O ...	1211	774	1875
3	Am_2SO_4, Super and K_2O ...	1304	829	2004
4	Cyanamide, Super and K_2O ...	1264	678	2079
5	Nitrate of Soda, Super and K_2O ...	1078	873	1717
6	$\frac{1}{2}$ Am_2SO_4, $\frac{1}{2}$ $NaNO_3$ Super and K_2O.	1123	847	1625
7	$\frac{1}{2}$ Cake, $\frac{1}{2}$ Am_2SO_4, Super and K_2O	1055	843	1650
8	$\frac{1}{2}$ Cake, $\frac{1}{2}$ $NaNO_3$, Super and K_2O.	1133	782	1525
9	$\frac{1}{3}$ Cake, $\frac{1}{3}$ Am_2SO_4, $\frac{1}{3}$ $NaNO_3$, and Super and K_2O.	1238	673	1666
10	$\frac{1}{2}$ G. N. Cake, $\frac{1}{2}$ Castor Cake, $\frac{1}{2}$ Bone, $\frac{1}{2}$ Super and K_2O.	1109	594	1744
	II. Series.—Variation of plant food ratios.			
1	Check	980	403	1834
2	25 lbs N, 37·5 lbs. P, and 50 lbs. K. (2 : 3 : 4.)	1125	427	1880
3	50 lbs. N, 37 lbs. P, and 50 lbs. K. (4 : 3 : 4.)	1190	450	1716
4	25 lbs. N, 50 lbs. P, and 50 lbs. K. (2 : 4 : 4.)	1355	376	1891
5	25 lbs. N, 37·5 lbs. P, and 75 lbs. K. (2 : 3 : 6.)	983	391	1481
	III. Series.—Time of application of manures.			
1	Check	1149	473	1877
2	Complete manure after monsoon...	1202	588	1882
3	Do before monsoon ...	1252	523	1590
4	Complete $\frac{1}{2}$ dose each time ..	1579	562	1729
	IV. Series.—Varying doses of mixtures.			
1	Check	1006	431	1803
2	Single dose	1165	559	1658
3	One and half dose	1131	405	1791
4	Double dose	1322	322	1487

APPENDIX IV.

Cost of labour for working the three kinds of sprayers, as per Coffee Station practice and 400 gallons per acre basis.

	Power Sprayer, 3 acres per day 1,200 gallons			Drake and Fletcher 2½ acres per day 1000 gallons, using 2 D. S. P.'s at one centre			8-Two gallons Hand sprayers 1 acre per day 400 gallons		
	Total No.	Rate of wages	Labour cost	Total No.	Rate of wages	Labour cost	Total No.	Rate of wages	Labour cost
		Rs. a. p.	Rs. a. p.		Rs. a. p.	Rs. a. p.		Rs. a. p.	Rs. a. p.
Attendant	1	0 8 0	0 8 0	...	...	...	...	...	...
Maistry	1	0 8 0	0 8 0	1	0 8 0	0 0	1	0 8 0	0 8 0
Male coolies	8	0 5 0	2 8 0	10	0 5 0	2 0	9	0 5 0	2 13 0
Female coolies ...	6	0 3	1 2 0	6	0 3 0	1 2 0	3	0 3 0	0 9 0
Commission on the wages of coolies.	...	10%	0 5 10	...	10%	0 6 10	...	10%	0 5 5
Fuel consumption, etc. ...	...	...	2 15 5*	...	...	0 5 3†	...	...	...
Total ...	...	Per acre 2 10 0	7 15 3	...	Per acre 2 3 3	5 8 1	...	Per acre 4 3 6	4 3 5

* *Fuel consumption for the power sprayer.*

	Rs. a. p.
1½ gallons petrol for a working day of 5 hours ...	2 3 5
30 ozs. of Mobile Oil	0 10 6
Cotton waste and grease, etc.	0 1 6
Total ...	2 15 5

† *For D. S. P. Sprayer.*

	Rs. a. p.
Grease, etc.	0 5 3

APPENDIX V.

Cost of spraying per acre with various kinds of sprayers, and mixtures in varying doses.

Formula :— 400 gallons of mixture per acre.

Full strength.	... ...	5	5	50	1 per cent.
Half ,,	... ...	2½	2½	50	½ per cent.

Kind of spray	Adhesive group in lbs. * per acre			Chemicals group in lbs. per acre					Total cost of materials per acre including adhesive	
	Resin in lbs	Casein in lbs	Linseed oil in ozs	Fish oil soap in lbs.	Copper sulphate in lbs.	Lime in lbs.	Alum in lbs.	Soda Ash in lbs.	1 per cent	½ per cent
1	2	3	4	5	6	7	8	9	10	11
1. Casein Bordeaux	...	8	...	...	40	40+8	...	...	13 14 0	7 10 0
2. Resin Bordeaux	16	...	...	...	40	40	...	4	15 4 0	9 2 0
3. Linseed Bordeaux 10 ozs	...	...	80 ozs.	...	40	40	...	...	13 14 0	7 12 0
4. Resin Burgundy	16	...	...	...	40	...	...	22+4	14 15 0	8 14 6
5. Fish Oil soap Burgundy	...	...	...	16	40	...	...	22	16 1 0	10 0 6
6. Alum Bordeaux	...	8	...	...	16	20+8	16	...	...	8 10 0
7. Bordeaux Plain	...	...	...	...	40	40	...	...	12 6 0	6 4 0

*In the half strength mixture, the quantity of adhesive used is the same as in 1 per cent.

Appendix V-A.

Kind of spray	Holder power sprayer. Cost per acre, materials plus labour 2 10 0 *Vide* App. IV.		Drake and Fletcher Sprayer. cost per acre, materials plus labour 2 3 3 *Vide* App. IV		8 Two gallon Hand sprayers cost of materials plus labour 4 3 6 *Vide* App. IV		Remarks
	1 per cent	½ per cent	1 per cent	½ per cent	1 per cent	½ per cent	
	12	13	14	15	16	17	18
1. Casein Bordeaux	16 8 0	10 4 0	16 1 3	9 14 9	18 1 6	11 13 6	Add 12 annas to Re. 1—4—0 for water supply. This will give the total spraying cost. The water lead assumed here is between 500–600 yards.
2. Resin Bordeaux	17 14 0	11 12 0	17 7 3	11 6 9	19 7 6	13 5 6	
3. Linseed Bordeaux 10 ozs	16 8 0	10 6 0	16 1 3	10 0 9	18 1 6	11 15 6	
4. Resin Burgundy	17 9 0	11 8 6	17 2 3	11 3 3	19 2 6	13 2 0	
5. Fish oil soap Burgundy	18 11 0	12 10 6	18 4 3	12 5 3	20 4 6	14 4 0	
6. Alum Bordeaux	.....	11 4 0	.....	10 14 9	.....	12 13 6	
7. Bordeaux Plain	15 0 0	8 14 0	14 9 3	8 8 9	16 9 6	10 7 6	

RATES OF MATERIALS.

1. Copper sulphate .... Rs. 25 8 0 per Cwt.
2. Resin ... ,, 0 2 6 ,, lb.
3. Casein ... ,, 0 2 0 ,, lb.
4. Soda ash ... ,, 0 1 6 ,, lb.
5. Lime ... Rs. 1 10 0 per tin or 0 1 0 per lb.
6. Alum ... ,, 0 1 0 ,, lb.
7. Fish oil soap ... ,, 0 4 0 ,, lb.
8. Linseed oil 80 ozs. ... ,, 1 8 0 ,, lb.

APPENDIX VI.

Varietal Spray Experiments.

Abstract of Yield of Coffee for 1931-32.

Abstract arranged in the descending order of efficiency taking the yield of different treatments into consideration.

Sl. No.	Treatment	Number of treatment	Number of yielding plants	Total yield		Average yield		Average yield per unit plot of 80 plants		Per acre 1200 plants	
				Lbs.	Ozs.	Lbs.	Ozs.	Lbs.	Ozs.	Lbs.	Ozs.
1	Cas. Bordeaux ...	3	212	539	2	179	11	203	7	3051	9
2	Lin. Bordo. 20 Ozs. ...	3	219	517	7	172	8	189	0	2835	0
3	Alum Bordo ...	3	203	466	8	155	8	183	13	2757	3
4	Lin. Bordo. 10 Ozs. ...	3	224	496	6	165	7	177	4	2658	12
5	Resin Bordo ...	3	227	487	5	162	7	171	11	2575	5
6	Lin. Bordo. 40 Ozs. ...	3	226	458	10	152	14	162	5	2434	11
7	Bordo No adhesive ...	3	212	385	10	128	9	145	8	2182	8
8	Resin Burgundy ...	3	210	370	10	123	9	141	3	2117	13
9	F. O. R. S. Burgundy ...	3	186	280	0	93	5	120	7	1806	9
10	Check ...	11	714	665	13	60	8	74	10	1119	6
11	Solbar * ...	3	218	170	11	56	14	62	10	939	6

*Discontinued since post monsoon and changed to Burgundy without an adhesive.

APPENDIX VII.

Crop Yield in time and Strength of Spray Blocks 1931-32.

Sl. No.	Treatment	Total No. of plants including non-bearing and supplies	No. of yielding plants only	Total yield in the plot	Yield per 500 plants unit
				Lbs.	Lbs.
1	Check	514	438	1436	1639
2	Pre—and Post—1% ...	1705	1358	3871	1425
3	Check	502	371	548	738
4	Pre—1%	1744	1366	2768	1013
5	Check	523	384	1405	1829
6	Pre—and Post—O. 5%.	1700	1322	5446	2059
7	Check	485	288	593	1026
8	Pre—O. 5% ...	1681	1104	1786	809
9	Check	500	351	468	667
10	Post—1%	1723	1357	2166	800
11	Check	514	375	499	666
12	Post—O. 5% ...	1831	1355	2310	852
13	Check	546	426	612	715

APPENDIX VIII.

Percentage of successful grafts during each month.

1 Nursery			2. Field			per cent age of success of 1 and 2
Month	No. of grafts made	No. successful	Month	No. of grafts made	No. successful	
October	144	1	October	...	...	1
November	111	38	November	28	15	38
December	144	60	December	...	...	42
January	337	178	January	...	...	53
February	40	28	February	6	6	74
March	47	32	March	13	13	75
April	70	35	April	55	30	52*
May	256	184	May	6	6	73
June	150	114 (76%)	June	120	112 (93%)	84
Total ...	1269	670	Total ...	228	182	

*During this month, mostly green and tender suckers were used.

APPENDIX. IX.

Statement showing the results of "Selfing and Hybridising" Coffee during 1929 and 1930.

Selfing in 1929–30			Crossing in 1929–30			
Varieties	No. of berries	No. of seedlings surviving for field observation	Varieties Mother plant	Pollen	No. of berries	No. of seedlings surviving for field observation
1. Parent of "Kent"	3	...	1. Merthi G. D. (S. 8)	K. "Kent" ...	7	1
2. Netraconda Hybrid S. 11	110	24	2. Netraconda Hybrid (S. 2)	Do ...	19	3
3. Do S. 13	33	12	3. Kumergod Hyb. (S. 7)	Do ...	16	2
4. K. "Kent" S. 15	31	2	4. K. Kent (S. 20)	Robusta ...	32	10
5. Do S. 16	12	4				
6. Do S. 18	77	26				
7. Do S. 19	59	9				
8. Coorg S. 22	124	43				

APPENDIX. X.

Statement showing the result of "Selfing and Hybridising" Coffee during 1930–31.

Selfing in 1930–31			Crossing in 1930–31			
Varieties	Seeds sown	Seedlings existing	Varieties	Pollen	Seeds sown	Seedlings existing
1. Kumergod S. 7	19	13	1. Kumergod S. 7	Kent ...	6	6
2 Golden drop S. 9	120	73	2. Golden drop S. 8	Kent ...	22	12
3. Netraconda Hybrid S 10	4	3	3. Do S. 9	Kent ...	98	75
4. Do S. 11	3	2	4. Kent. (behind quarters ii. row S. 23)	Robusta ...	85	68
5. Kent S. 16	21	19	5. Netraconda Hybrid S. 24	(1) Kent ...	34	24
6. Do S. 18	42	28	Do	(2) Robusta ...	10	5
7. Do S. 19	26	23	6. Handi–Kent S. 25	Robusta ...	2	2
8. Doobla Hybrid S. 26	203	79				
9. Bunch bearing Biccode S. 28	33	28				

APPENDIX XI

**Letter No Roc. 1121 Sc. 151 of 31-32, dated 16th January 1932, from the Director of Agriculture in Mysore, Bangalore to the Editor, Planters' Chronicle, Madras.*

Dr. S. Leefmans, Chief of the Institute for Plant Disease, Department of Agriculture, Buitenzorg, Java, has drawn my attention to a misstatement in my Report on the Coffee Berry Borer. On page 16 of this report, I have stated that samples of seeds have been received here from Java accompanied by a certificate of fumigation and these seeds were found badly infested with insects.

Dr. Leefmans has pointed out to me that the certificate sent with this seed was not a certificate of fumigation but of inspection. On looking up the typewritten certificate received, I now find that the word 'fumigated' has been crossed out with a pencil. This slipped the attention of Dr. Badami who first reported the matter to me and I also overlooked it in hurriedly going through the certificate at the time it was received. I very greatly regret this error of statement on my part.

Dr. Leefmans in his letter to me indicates that he sees in my remarks a severe criticism of the fumigation section of his institute. This was not intended. All I wished to point out was the danger of accepting fumigation certificates whatever their origin and the impossibility of guaranteeing that seed imported under a fumigation certificate is free from insect pests. I have a very high admiration for Dr. Leefmans and the work being done in the Institute of which he is the head. If the remarks made by me in my report have led readers to think otherwise, I wish to correct any wrong impression created.

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* The letter above was published in the Planters' Chronicle, Vol XXVII, No. 3, dated 30th January 1932 and is published here to give the correction greater publicity.

WD—523—GPB—1,000—22-12-32.